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10:30AM–12:00NOON, Room 41
Assessment of Prognosis and Viability by Nuclear Techniques

DIPYRIDAMOLE-TL-201 IMAGING VERY EARLY POST-MYOCARDIAL INFARCTION PREDICTS IN-HOSPITAL AND LATE CARDIAC EVENTS

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We tested the ability of dipyridamole-Tl-201 imaging (DpTl) performed very early (mean 62 ± 21 hr, range 23-102 hr) after acute myocardial infarction (MI) in 50 pts (25 with thrombolytic agents) to predict in-hospital and late cardiac events (MI, cardiac death, angina). In-hospital, 1 pt had recurrent MI, and 8 pts had recurrent post-MI angina + ST↓ at a mean 60 ± 42 hours after DpTl. No pt died in-hospital. There were no serious adverse effects during DpTl. With multivariate logistic regression, the best and only significant predictor of in-hospital cardiac events was Tl-201 redistribution (RD) within the infarct zone ($p = 0.0001$). Of 20 pts with infarct zone RD, 9 (44%) developed in-hospital cardiac events compared to 0 of 30 pts without infarct zone RD ($p < 0.0001$). When cardiac catheterization data were available (34 pts), infarct zone Tl-201 RD remained the only significant multivariate predictor of in-hospital ischemic cardiac events. During a follow-up of 12 ± 7 mo, 3 additional pts with infarct zone RD had recurrent MI (2 pts) or unstable angina (1 pt), while no pt without infarct zone RD had cardiac events. Thus, overall, 12/20 (60%) of pts with infarct zone RD had a cardiac event compared to 0/30 pts without infarct zone RD ($p < 0.0001$).

Infarct zone RD on DpTl performed very early after acute MI identifies pts at high risk for in-hospital and late cardiac events. Pts without infarct zone RD appear to be at very low risk for early and late events and may be candidates for earlier discharge.

DOES TWENTY-FOUR HOUR DELAYED IMAGING FOLLOWING THALLIUM REINJECTION ENHANCE DETECTION OF VIABLE MYOCARDIUM?

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Thallium (Tl) reinjection (RI) immediately after stress-redistribution imaging has been shown to improve the detection of ischemic myocardium. To determine whether further 24 hour imaging following RI provides additional information beyond that obtained by RI, we studied 15 pts with angiographically proven coronary artery disease by exercise Tl SPECT. Immediately following redistribution (R) images, 1 mCi of Tl was injected at rest and images were reacquired 10-15 min and 24 hrs after RI. The stress (S), R, RI, and 24hr images were then normalized and analyzed in 5 myocardial regions representing the 3 major coronary artery vascular territories from grade 0=absent to 2=normal.

Of the 75 total regions analyzed, 39 had abnormal Tl uptake on S, of which 12(31%) were read as "fixed" on R. However, 6 of these "fixed" defects (50%) demonstrated improved Tl uptake after RI, and only 1 region that was fixed on RI had improved Tl uptake on the 24hr image. Of the remaining 27 abnormal regions on S, 16 showed only partial reversibility on R, all of which showed further improvement after RI. Only 2 of these regions normalized even further on the 24hr image.

Thus, TL RI at rest following R provides most of the clinically relevant information pertaining to ischemia and myocardial viability in regions with persistent defects. As such, TL RI may be utilized instead of 24 hr imaging in the majority of pts in whom persistent Tl defect is observed on conventional R images.

A MODEL TO PREDICT MULTIVESSEL DISEASE AND CARDIAC EVENTS FROM EXERCISE THALLIUM-201 DATA USING ORDINAL LOGISTICS.

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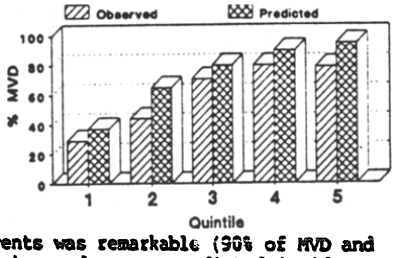
The thallium-201 exercise test (TET) has been shown to be useful in determining the presence of multivessel disease (MVD) and prognosis in patients with coronary artery disease (CAD). Although variables from the TET have been shown to be useful in specific studies, their utility has not been demonstrated in other pt. populations. Using ordinal logistics, we developed a model to predict MVD from the TET data in 383 patients studied at the University of Virginia. The model predicted the presence of MVD based upon age, presence of ST depression, and the number of defects on thallium-201 images: $(p(MVD) = {}^{1}/(1+Exp(x))$ where $x = 2.4 - age\ (0.28) - ST\ depression\ (1.24) - thallium\ defects\ (0.46)$. The model was highly reliable in determining MVD and predicting cardiac events (death, nonfatal myocardial infarction, and revascularization procedure) in our own pt cohort. It identified 83% of pts with MVD and 85% with cardiac events. The model was then applied to 292 pts studied at the Massachusetts General Hospital. The ability of the model to predict MVD and events was remarkable (90% of MVD and 71% of events). The observed versus predicted incidence of MVD in these pts is depicted in the Figure.



In conclusion, we present a model which is sufficiently robust to predict presence of MVD and cardiac events in pts undergoing thallium-201 stress testing which could be applied to other pt cohorts.

ASSESSMENT OF MYOCARDIAL VIABILITY DURING ACUTE INFARCTION WITH PLANAR IMAGING OF GLUCOSE METABOLISM AND PERFUSION AFTER THROMBOLYTIC THERAPY.

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Early noninvasive assessment of the viability of myocardial segments in the coronary care unit (CCU) after thrombolytic therapy for acute myocardial infarction (AMI) may help define risk of future events and need for further therapy. Using a mobile planar gamma camera fitted with lead shielding and a parallel hole rotating tungsten collimator, we imaged myocardial perfusion and glucose metabolism with thallium-201 (TL) and the glucose analog 18-fluoro-2-deoxyglucose (FDG) in 14 AMI patients (pts); 5 were treated with thrombolytic agents (LYT) and 9 were not (NLYT). FDG and TL images were obtained in 3 views. Circumferential profiles of the TL and FDG images were quantitated and compared with a normal data base. The NLYT pts had a TL defect score of 72.2 ± 8.6 (mean ± SE, out of a possible score of 192) versus 45.8 ± 12.3 in the LYT pts ($p < 0.10$). The fraction of excess FDG uptake relative to the quantitative extent and severity of the TL defects was much larger in the LYT pts than in the NLYT pts (38.1% ± 9.9% vs. 5.7% ± 1.6%, $p < 0.001$).

Thus, in this pilot study LYT resulted in significantly greater preservation of segmental glucose metabolism and a trend toward smaller perfusion defects in pts with AMI. With planar imaging, this technique can be applied early after LYT for AMI while pts are in the CCU.